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U.S. Department of the Interior • U.S. Geological Survey

# MINERAL INDUSTRY SURVEYS

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## NICKEL IN SEPTEMBER 1996

Reported domestic nickel consumption in September, on a daily average basis, was almost identical to that of August, according to the U.S. Geological Survey. Daily usage by the stainless steel industry was down about 5% from the revised August figure of 104 metric tons (t). However, consumption of elemental nickel to make nickel-base corrosion resistant alloys increased slightly. Increased demand for elemental nickel by the brass industry was offset by reduced consumption by producers of superalloys. Sales to plating companies averaged 38 t per day, the same as in August. Percentages reported in this paragraph may not be verifiable due to the concealment of company proprietary data. Trade data for September will appear in a subsequent issue.

### Update

#### **Inco proposes to build a greenfield smelting and refining complex in Newfoundland to process concentrate from Voisey's Bay**

On November 29, 1996, Voisey's Bay Nickel Company Ltd. announced that it was planning to build a smelting and refining complex at Argentia on the island of Newfoundland.<sup>1</sup> The complex would process nickel-cobalt concentrate shipped by sea from the company's future mine and mill near Voisey's Bay in northeastern Labrador. The Argentia site also is relatively close to recently discovered resources of disseminated and massive nickel sulfides in the Lac Manitou, Sept-Îles, and Gaspé regions of southeastern Quebec. All three regions could conceivably supply additional concentrate for the smelter by the year 2010. The Voisey's Bay Nickel Co. is now a wholly-owned subsidiary of Inco Ltd. Inco gained control of both the company and its world class nickel-copper-cobalt sulfide deposit when it acquired Diamond Fields Resources Inc. on August 21, 1996. (See *Nickel in June 1996*.)

Argentia was chosen over a number of other sites on the

island and in Labrador. The proposed site is on the north side of a former U.S. naval base, about 130 kilometers west of St. John's. The site evaluation process took 3 months and was conducted for Inco by Bechtel Canada Inc. The greenfield complex would cover about 2 square kilometers (500 acres) and have an annual production capacity of 122,000 t of nickel and 3,000 t of cobalt, making it the largest nickel operation outside of Russia. It also would be somewhat larger than Inco's operation at Sudbury which is rated at about 100,000 t per year of Ni in smelter products. Argentia is on tidewater and close to some major North Atlantic shipping lanes, permitting Voisey's Bay Nickel to economically supplement its feedstocks with nickel concentrate purchased on the world market. About 16,000 t per year of copper would be produced as a byproduct from the nickel-cobalt concentrate.

The mill at Voisey's Bay also would produce a separate, predominantly chalcopyrite (i.e., copper-rich) concentrate. This second sulfide concentrate, representing about 80% of the copper in the ore, would be processed elsewhere for economic reasons. A viable, dedicated copper smelting and refining operation would require considerable more copper concentrate than that projected from Voisey's Bay.

#### **A new zone of nickel mineralization has been discovered at Voisey's Bay**

Drilling crews have identified a new zone of nickel-copper-cobalt mineralization within the Voisey's Bay deposit.<sup>2</sup> Only three principal zones (i.e., sections) were known prior to this latest discovery: the Ovoid, the Eastern Deep, and the Western Extension. The three previously identified zones are associated with the Reid Brook Intrusion and, in plan view, are aligned over a distance of almost 6 kilometers, with the Ovoid being in the middle. The new, fourth zone lies beneath, and is partly contiguous with, the shallower zone of the Western Extension.

The newly discovered zone is in the shape of a flattened cylinder that plunges to the east towards the Ovoid. The mineralization lies 250 to 600 meters below the surface, extending over a strike length of at least 500 meters. Drill hole assays from the core of the zone range from 1.2% to 2.8% Ni, indicating that the mineralization is richer than the disseminated sulfide resource found in the Eastern Deeps.

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<sup>1</sup>Voisey's Bay Nickel Co. Ltd. (St. John's, Nfld.) Argentia selected as proposed site for smelter/refinery complex. News release. Nov. 29, 1996, 2 pp. See also: Brockelbank, T. Inco settles on site for Voisey's Bay smelter. The Northern Miner, v. 82, No. 41, Dec. 9, 1996, pp. 1-2.

<sup>2</sup>Inco Media Information. Inco announces new nickel zone at Voisey's Bay deposit. In 03/97, Toronto Ontario, Jan. 31, 1997, 2 pp.

TABLE 1  
CONSUMPTION OF NICKEL (EXCLUSIVE OF SCRAP), BY FORM AND USE 1/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total	Total year to date
1995:					
September	7,720	2,460	309	10,500	79,900 r/
October	6,590	1,840	337	8,770	88,700
November	5,830	1,690	630	8,150	96,900
December	6,250	1,860	244	8,360	105,000
January-December	82,900	17,400	4,950	105,000	XX
1996:					
January	6,930	1,500	309	8,740	8,740
February	7,010	1,230	268	8,510	17,200
March	6,760	1,480	318	8,560	25,800
April	6,620	1,490	249	8,360	34,200
May	7,060	1,470	285	8,820	43,000
June	6,690	1,530	236	8,450	51,400
July	6,490	1,160	130	7,780	59,200
August	6,340 r/	1,450	141 r/	7,940 r/	67,100 r/
September:					
Steel:					
Stainless and heat resisting	1,520	1,430	W	2,960	28,100
Alloy (excludes stainless)	346	W	W	346	5,330
Superalloys	930	--	W	930	9,730
Copper-nickel alloys	W	W	--	W	W
Electrical, magnetic, and expansion alloys	W	--	--	W	W
Other nickel & nickel alloys	1,280	--	W	1,280	13,300
Cast iron	W	--	--	W	W
Electroplating (sales to platers)	1,200	--	W	1,200	10,800
Chemical and chemical uses	W	--	W	W	W
Other uses	775	109	123	1,010	7,560
Total reported	6,050 2/	1,540	123	7,720	74,900
Total all companies (calc) 3/	XX	XX	XX	11,200	109,000
1996: January-September	59,900	12,900	2,060	74,900	XX
1995: January-September	64,200	12,000	3,740	79,900	XX

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Other uses" category.

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Of consumption, 4,960 metric tons were consumed as cathodes and pellets, the remainder as briquets and powder.

3/ Figures represent calculated apparent consumption; based on the revised proportion of reported primary consumption (68.69%) to apparent primary consumption for 1994.

TABLE 2  
ENDING STOCKS OF NICKEL (EXCLUSIVE OF SCRAP) HELD BY CONSUMERS,  
BY FORM AND USE 1/ 2/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total
1995:				
September	4,300	324	123	4,750
October	4,900	429	115	5,450
November	5,630	362	115	6,110
December	5,190	635	204	6,030
1996:				
January	4,690	329	106	5,120
February	5,060	292	95	5,450
March	4,610	207	69	4,890
April	4,430	131	81	4,640
May	4,060	342	92	4,500
June	3,640	337	91	4,070
July	3,570 r/	516	70	4,160 r/
August r/	3,370	429	77	3,870
September:				
Steel (stainless, heat resisting and alloy)	866	276	(3/)	1,140
Nonferrous alloys 4/	1,870	--	(3/)	1,870
Foundry (cast irons)	(3/)	--	(3/)	(3/)
Chemical (catalysts, ceramics, plating salts, etc.) and unspecified uses	150	--	49	199
Total	2,890	276	49	3,210

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Stocks held by companies that consume nickel in more than one end use category are credited to the major category. Stocks are subject to revision owing to inventory adjustment.

3/ Included in "Chemicals and unspecified uses" category.

4/ Includes super, nickel-copper and copper-nickel, permanent magnet, and other nickel alloys.

TABLE 3  
CONSUMPTION AND ENDING STOCKS OF PURCHASED SECONDARY NICKEL, BY USE 1/

(Metric tons, nickel content)

Period	Consumption			Stocks		
	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap
1995:						
September	4,140	729	4,870	3,200	96	3,300
October	3,030	650	3,680	3,490	103	3,600
November	4,300	901	5,200	3,240	109	3,350
December	3,970	644	4,620	3,500	103	3,600
January-December	48,900	9,200	58,100	XX	XX	XX
1996:						
January	3,430	760	4,190	3,710	121	3,830
February	3,380	1,120	4,500	4,190	114	4,310
March	4,680	965	5,650	3,970	91 r/	4,060
April	3,900	815 r/	4,710	3,750	90	3,840
May	4,110	783 r/	4,890 r/	3,130	100	3,230
June	2,540	625 r/	3,170 r/	3,380	100	3,480
July	2,760	680 r/	3,440	3,720	97	3,820
August	2,010	1,070 r/	3,070 r/	3,780	98 r/	3,880 r/
September	2,470	1,100	3,570	3,460	109	3,570
January-September	29,300	7,910	37,200	XX	XX	XX

r/ Revised. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Nickel content is calculated from an average nickel content and the reported gross weight of scrap.

3/ Combined consumption and stocks of aluminum-base, copper-base, and nickel-base scrap.

TABLE 4  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of origin	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1995:										
August	10,400	628	1,500	23	303	290	328	13,500	106,000	44
September	9,060	767	1,880	71	332	271	518	12,900	119,000	33
October	11,200	859	1,470	32	342	211	302	14,400	133,000	33
November	9,200	820	1,440	35	387	261	346	12,500	146,000	34
December	8,930	563	830	25	308	239	210	11,100	157,000	77
January-December	118,000	9,510	16,700	530	4,740	3,190	4,210	157,000	XX	2,310
1996:										
January	11,000	1,030	887	46	333	313	377	14,000	14,000	51
February	9,970	709	1,540	14	309	312	419	13,300	27,200	55
March	9,130	917	2,130	39	385	369	241	13,200	40,400	60
April	11,300	760	980	21	344	313	187	13,900	54,300	52
May	11,000	945	2,020	91	411	319	219	15,000	69,400	72
June	7,750	927	1,430	9	343	289	254	11,000	80,400	43
July	7,230	684	1,470	18	238	274	216	10,100	90,500	42
August:										
Australia	1,770	320	--	--	--	--	(5/)	2,090	11,200	--
Brazil	--	--	--	--	--	--	--	--	351	--
Canada	3,410	401	--	--	64	144	12	4,040	37,900	1
Colombia	--	--	136	--	--	--	1	137	778	--
Dominican Republic	--	--	677	--	3	--	--	680	6,600	--
Finland	387	37	--	--	--	--	34	458	2,360	(5/)
France	169	(5/)	--	--	23	--	65	257	1,550	22
Germany	--	9	--	--	25	--	36	70	485	11
Japan	(5/)	--	--	--	7	13	12	32	595	7
New Caledonia	--	--	300	--	--	--	--	300	3,240	--
Norway	2,280	--	--	--	--	--	--	2,280	17,000	--
Russia	1,030	36	--	--	--	--	--	1,070	13,800	--
South Africa	20	--	--	--	--	--	--	20	666	--
United Kingdom	41	12	--	--	74	--	17	144	1,040	1
Zimbabwe	134	--	--	--	--	--	--	134	1,360	--
Other	--	18	6	14	40	161	87	327	3,660	2
Total	9,250	835	1,120	14	235	319	265	12,000	103,000	44
1996: January-August	76,600	6,800	11,600	251	2,600	2,510	2,180	103,000	XX	419
1995: January-August	79,600	6,500	11,100	368	3,370	2,210	2,830	106,000	XX	2,140

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 5  
U.S. EXPORTS OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of destination	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1995:										
August	226	118	76	340	1,540	3,400	186	5,890	34,500	42
September	46	69	77	240	1,090	2,240	185	3,950	38,500	39
October	44	239	3	297	1,830	2,410	289	5,110	43,600	51
November	38	72	235	196	1,270	2,370	117	4,300	47,900	18
December	21	74	294	471	827	1,800	164	3,650	51,500	147
January-December	1,310	1,230	807	3,500	14,200	27,600	2,920	51,500	XX	475
1996:										
January	7	69	429	262	714	1,570	158	3,210	3,210	22
February	72	53	60	78	903	1,430	305	2,900	6,110	23
March	80	92	181	271	859	1,140	261	2,880	8,990	52
April	149	63	119	134	965	2,760	389	4,570	13,600	27
May	82	171	220	331	782	1,520	519	3,620	17,200	31
June	79	142	73	616	800	1,530	295	3,530	20,700	19
July	7	50	650	480	778	2,650	364	4,980	25,700	30
August:										
Australia	--	--	--	--	--	--	--	--	62	--
Belgium	--	--	--	--	--	(5/)	29	29	238	1
Canada	8	78	--	327	299	316	51	1,080	10,300	5
Germany	(5/)	--	--	--	88	2	1	91	535	(5/)
India	--	(5/)	--	--	--	--	2	2	930	--
Italy	--	1	--	--	--	--	--	1	14	--
Japan	--	4	--	--	27	78	87	196	2,500	(5/)
Korea, Republic of	--	4	--	--	--	495	(5/)	499	3,120	1
Mexico	32	1	--	(5/)	2	--	23	58	309	44
Netherlands	--	--	--	--	--	4	19	23	209	1
Spain	--	1	--	--	--	861	(5/)	862	3,720	--
Sweden	--	1	--	--	271	4	--	276	1,620	--
Taiwan	--	1	299	--	--	257	7	565	3,600	--
United Kingdom	1	2	--	--	3	8	1	15	249	9
Other	3	6	--	20	12	178	203	422	2,390	3
Total	44	97	299	348	703	2,200	424	4,120	29,800	64
1996: January-August	520	738	2,030	2,520	6,510	14,800	2,720	29,800	XX	270
1995: January-August	1,160	772	198	2,290	9,140	18,800	2,160	34,500	XX	220

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of origin	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date 2/
1995:									
August	288	158	127	175	(3/)	162	34	945	6,700
September	113	66	109	90	(3/)	86	23	488	7,190
October	340	46	89	107	(3/)	93	44	717	7,900
November	179	61	169	112	(3/)	39	43	603	8,510
December	79	183	158	130	3	49	29	632	9,140
January-December	3,000	1,180	2,030	1,510	3	1,040	378	9,140	XX
1996:									
January	114	212	154	116	(3/)	98	43	738	738
February	259	152	75	92	(3/)	65	61	704	1,440
March	300	176	151	123	(3/)	107	58	916	2,360
April	561	180	158	132	(3/)	95	20	1,150	3,500
May	178	249	175	170	(3/)	67	18	858	4,360
June	221	242	116	157	(3/)	71	54	861	5,220
July	188	117	195	90	(3/)	44	107	743	5,960
August:									
Australia	31	--	--	--	--	--	--	31	715
Belgium	9	--	--	--	--	--	(3/)	9	108
Brazil	--	--	--	--	--	--	--	--	10
Canada	--	--	3	1	--	20	1	25	232
France	--	3	(3/)	7	--	3	1	14	853
Germany	--	88	53	176	(3/)	4	9	330	1,930
Italy	--	69	7	--	--	3	15	95	518
Japan	6	--	2	--	--	7	(3/)	16	201
Mexico	(3/)	--	--	--	--	--	(3/)	(3/)	57
Netherlands	--	--	(3/)	--	--	10	4	13	86
South Africa	19	--	--	--	--	--	--	19	587
Sweden	--	--	30	2	--	--	--	32	389
United Kingdom	26	32	(3/)	(3/)	(3/)	1	556	616	1,170
Other	--	26	(3/)	(3/)	--	1	28	58	371
Total	91	219	97	187	(3/)	49	615	1,260	7,220
1996: January-August	1,910	1,550	1,120	1,070	1	596	975	7,220	XX
1995: January-August	2,290	826	1,500	1,070	1	775	238	6,700	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 7  
U.S. EXPORTS OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of destination	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total 2/	Total year to date 2/
1995:									
August	276	162	104	765	11	110	169	1,600	12,200
September	202	169	173	435	20	98	135	1,230	13,400
October	295	251	105	456	17	65	248	1,440	14,900
November	325	244	124	696	8	63	472	1,930	16,800 r/
December	456	390	173	754	8	117	146	2,040	18,900
January-December	4,170	3,410	1,510	6,230	153	1,240	2,150	18,900	XX
1996:									
January	447	268	59	685	6	118	391	1,970	1,970
February	529	330	70	613	15	205	291	2,050	4,030
March	331	308	121	631	20	100	170	1,680	5,710
April	651	337	138	441	43	149	648	2,410	8,120
May	508	219	149	792	7	89	242	2,010	10,100
June	531	270	155	676	60	81	168	1,940	12,100
July	335	349	148	628	8	84	451	2,000	14,100
August:									
Australia	--	--	1	73	--	--	(3/)	74	878
Belgium	5	2	--	(3/)	--	(3/)	2	8	181
Canada	179	13	38	79	3	39	31	382	2,850
France	61	11	4	3	--	1	22	102	1,710
Germany	8	21	1	6	1	--	5	42	474
India	--	(3/)	(3/)	1	--	(3/)	(3/)	2	63
Ireland	--	--	61	2	--	--	(3/)	63	193
Italy	(3/)	2	1	64	--	2	1	70	795
Japan	156	4	1	126	(3/)	5	18	311	2,090
Korea, Republic of	2	--	11	4	--	5	12	34	234
Mexico	--	(3/)	16	1	(3/)	25	1	45	933
Netherlands	37	15	1	4	--	(3/)	2	59	286
Singapore	1	5	1	--	--	--	1	8	111
Spain	--	--	--	--	--	--	--	--	117
Sweden	7	1	(3/)	6	(3/)	--	2	16	106
Switzerland	10	(3/)	(3/)	5	--	(3/)	7	22	165
Taiwan	--	(3/)	3	--	--	(3/)	36	39	127
United Kingdom	21	95	15	240	(3/)	8	5	384	2,500
Other	51	13	22	5	(3/)	11	38	140	2,050
Total	540	184	176	619	5	96	183	1,800	15,900
1996: January-August	3,870	2,260	1,020	5,080	165	921	2,540	15,900	XX
1995: January-August	2,890	2,350	934	3,890	99	901	1,150	12,200	XX

r/ Revised. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 8  
NICKEL CONSUMPTION IN CAST AND WROUGHT PRODUCTS

	Percent	
	Wrought	Cast
September 1996:		
Stainless and heat resisting steels	100	(1/)
Alloy steels	99	1
Superalloys	69	31
Copper-nickel alloys	95	5
Other nickel-base alloys	100	(1/)

1/ Less than 1/2 unit.

TABLE 9  
NICKEL PRICES

Date	Cathode NY Dealer \$/lb.	LME Cash \$/t	LME Cash \$/lb.	18/8 Stainless steel scrap Pittsburgh \$/long ton(gw)
1996:				
Average for month of:				
August	3.304	7,054.357	3.200	762
September	3.397	7,318.048	3.319	760
For week ending:				
August 2	3.22-3.30	6,894.000	3.127	750-775
August 9	3.24-3.38	7,136.000	3.237	750-775
August 16	3.28-3.35	6,992.800	3.172	750-775
August 23	3.32-3.43	7,103.000	3.222	750-775
August 30	3.41-3.44	7,281.250	3.303	750-775
September 6	3.42-3.48	7,373.200	3.344	740-765
September 13	3.41-3.50	7,492.300	3.398	750-775
September 20	3.40-3.45	7,300.500	3.311	750-775
September 27	3.37-3.43	7,158.300	3.247	750-775
October 4	3.26-3.40	6,974.300	3.163	750-775
October 11	3.26-3.30	6,989.500	3.170	750-775
October 18	3.33-3.36	6,992.600	3.172	750-775

Sources: Platt's Metals Week and American Metal Market.